THAT WHICH IS CLAIMED:

1. A composite material collation machine comprising:

a laser diode array for heating at least one fiber tape;

a compaction device for pressing the fiber tape against a workpiece in a compaction region such that the fiber tape conforms to the contour of the workpiece and is adhered thereto;

an inspection system for monitoring at least one of the fiber tape and the workpiece, the inspection system producing an output representative of at least one characteristic of at least one of the fiber tape and the workpiece; and

a controller capable of receiving the output from the inspection system and automatically altering at least one system parameter defining an operational characteristic of the composite material collation machine based thereon.

2. The composite material collation machine of Claim 1 wherein the laser diode array is configured to irradiate a plurality of irradiation zones such that each irradiation zone can be irradiated independently of the other irradiation zones.

3. The composite material collation machine of Claim 2 wherein at least one of the irradiation zones defines an area on the fiber tape and at least one of the irradiation zones defines an area on the workpiece.

4. The composite material collation machine of Claim 1 wherein the inspection system further comprises a camera for receiving images of the fiber tape after the fiber tape has passed through the compaction region.

5. The composite material collation machine of Claim 1 wherein the inspection system further comprises a tack monitoring device capable of measuring the molecular mobility of a resin of the fiber tape.

6. The composite material collation machine of Claim 1 wherein the inspection system generates an output representative of at least one characteristic of the fiber tape, the characteristic selected from the group

consisting of temperature of the fiber tape, temperature of the workpiece, rate of placement of the fiber tape, compaction pressure, tack of the fiber tape, and placement of the fiber tape relative to another fiber tape.

7. The composite material collation machine of Claim 1 wherein the controller is capable of automatically altering at least one of the system parameters selected from the group consisting of temperature of the fiber tape, temperature of the workpiece, rate of placement of the fiber tape, compaction pressure, tack of the fiber tape, and placement of the fiber tape relative to another fiber tape.

8. The composite material collation machine of Claim 1 further comprising a temperature sensor capable of measuring the temperature of the fiber tape.

9. The composite material collation machine of Claim 8 wherein the temperature sensor is configured to measure the temperature of at least one sensing zone and the controller is capable of automatically controlling the laser diode array to independently irradiate a plurality of irradiation zones, wherein each of the sensing zones and the irradiation zones defines an area selected from the group consisting of an area on one of the fiber tapes and an area on the workpiece.

10. The composite material collation machine of Claim 1 further comprising a marking device responsive to said controller for indicating defects on the fiber tape.

11. The composite material collation machine of Claim 1 wherein the composite material collation machine comprises a fiber tape placement machine.

12. A method of forming a composite article from composite fiber tape, the method comprising:

irradiating at least one fiber tape with a laser diode array;

compacting the irradiated fiber tape against a workpiece such that the fiber tape conforms to the contour of the workpiece and is adhered thereto;

inspecting the fiber tape and producing an output representative of at least one characteristic of the fiber tape; and

automatically altering at least one system parameter defining an operational characteristic of the method based on the output.

13. The method of forming a composite article of Claim 12 wherein inspecting the fiber tape comprises inspecting images of the fiber tape after the fiber tape has been compacted.

14. The method of forming a composite article of Claim 12 wherein inspecting the fiber tape comprises measuring the molecular mobility of a resin of the fiber tape.

15. The method of forming a composite article of Claim 12 wherein inspecting the fiber tape comprises detecting the tack of the resin of the fiber tape before compacting the fiber tape against the workpiece, and wherein automatically altering at least one system parameter comprises automatically altering the temperature of the fiber tape before compacting the fiber tape against the workpiece based on the tack of the resin of the fiber tape.

16. The method of forming a composite article of Claim 12 wherein inspecting the fiber tape produces an output representative of at least one characteristic of the fiber tape, the characteristics selected from the group consisting of temperature of the fiber tape, temperature of the workpiece, rate of placement of the fiber tape, compaction pressure, tack of the fiber tape, and placement of the fiber tape relative to another fiber tape.

17. The method of forming a composite article of Claim 12 wherein automatically altering at least one of the system parameters comprises automatically altering at least one system parameter selected from the group consisting of temperature of the fiber tape, temperature of the workpiece, rate of placement of the fiber tape, compaction pressure, tack of the fiber tape, and placement of the fiber tape relative to another fiber tape.

18. The method of forming a composite article of Claim 12 further comprising:

measuring the temperature in a plurality of sensing zones on at least one of the fiber tape and the workpiece; and

automatically and independently irradiating a plurality of irradiation zones in accordance with the measured temperature.

19. The method of forming a composite article of Claim 12 further comprising marking an area of the fiber tape to indicate a defect based on the inspection of the fiber tape.